

Borehole

20-10-12**Log Event A****Borehole Information**

Farm : <u>B</u>	Tank : <u>B-110</u>	Site Number : <u>299-E33-214</u>
N-Coord : <u>45,280</u>	W-Coord : <u>52,855</u>	TOC Elevation : <u>654.27</u>
Water Level, ft :	Date Drilled : <u>8/31/1973</u>	

Casing Record

Type : <u>Steel-welded</u>	Thickness, in. : <u>0.280</u>	ID, in. : <u>6</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>120</u>	

Borehole Notes:

Borehole 20-10-12 was drilled in August 1973 to a depth of 100 ft with 6-in. casing. Data from the drilling log and Chamness and Merz (1993) were used to provide borehole construction information. The drilling log reports that the borehole was perforated in November 1973 and lists a borehole completion depth of 100 ft at that time, but does not specify the range of the perforated interval.

The current total depth of the borehole was measured at 120.8 ft; however, available records do not report that this borehole was deepened. Furthermore, historical gross gamma log data show that this borehole was logged to a depth of 120 ft as early as January 1975, indicating that the borehole was deepened sometime between mid-November 1973 and January 1975.

There is no mention that the borehole casing was grouted. The casing thickness is presumed to be 0.280 in., on the basis of the published thickness for schedule-40, 6-in. steel tubing.

Equipment Information

Logging System : <u>2B</u>	Detector Type : <u>HPGe</u>	Detector Efficiency : <u>35.0 %</u>
Calibration Date : <u>11/97</u>	Calibration Reference : <u>GJO-HAN-20</u>	Logging Procedure : <u>MAC-VZCP 1.7.10-1</u>

Logging Information

Log Run Number : <u>1</u>	Log Run Date : <u>10/23/1998</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>0.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>24.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>

Log Run Number : <u>2</u>	Log Run Date : <u>10/26/1998</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>120.5</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>105.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>

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Log Run Number :	<u>3</u>	Log Run Date :	<u>10/26/1998</u>	Logging Engineer:	<u>Alan Pearson</u>
Start Depth, ft.:	<u>106.0</u>	Counting Time, sec.:	<u>100</u>	L/R : <u>R</u>	Shield : <u>N</u>
Finish Depth, ft. :	<u>77.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

Log Run Number :	<u>4</u>	Log Run Date :	<u>10/27/1998</u>	Logging Engineer:	<u>Alan Pearson</u>
Start Depth, ft.:	<u>78.0</u>	Counting Time, sec.:	<u>100</u>	L/R : <u>R</u>	Shield : <u>N</u>
Finish Depth, ft. :	<u>23.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

Logging Operation Notes:

This borehole was logged in four log runs. The top of the borehole casing, which is the zero reference for the SGLS, rises approximately 2.5 ft above the ground surface. The total logging depth achieved by the SGLS was 120.5 ft.

Excessive dead time was encountered from 24 to 105 ft. As a result, log runs three and four were logged in real time from 23 to 106 ft. The remainder of the borehole was logged in live time.

Analysis Information

Analyst : E. LarsenData Processing Reference : MAC-VZCP 1.7.9Analysis Date : 02/02/1999**Analysis Notes :**

The pre-survey and post-survey field verification for each logging run met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from the accepted calibration spectrum that most closely matched the field data were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

A casing correction factor for a 0.280-in.-thick steel casing was applied to the concentration data during the analysis process.

Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.



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A plot of the shape factor analysis results is included. The plot is used as an interpretive tool to help determine the radial distribution of man-made contaminants around the borehole.

Plots of the historical gross gamma log data from 1975 to 1994 are presented with the SGLS log plots. The log-plot sequence can be used to help identify any historical changes in gross gamma activity. Also included is a comparison plot of the SGLS dead time, historical GM- and scintillation-detectors, and an interpretation of the data.

Results/Interpretations:

Detector saturation occurred from 25.5 to 100 ft. As a result, no spectral data were collected along that region of the borehole.

The man-made radionuclides Cs-137, Co-60, Eu-154, and U-235 were detected by the SGLS around this borehole. The Cs-137 contamination was measured continuously from the ground surface to 25 ft and from 100 ft to the bottom of the logged interval (120.5 ft). Single occurrences of Co-60 were detected at 118 and 119 ft. An isolated occurrence of Eu-154 contamination was detected from 23.5 to 24 ft. A single occurrence of U-235 was detected at 101.5 ft. U-235 contamination was also measured nearly continuously from 103.5 to 107 ft.

The K-40 and Th-232 concentrations are absent between 24 and 101.5 ft. Almost all of the U-238 concentrations are absent between 2.5 ft and the bottom of the logged interval.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Reports for tanks B-110 and B-111.